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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/373,544	08/13/1999	HIROSHI NAKATSU	829-522	2693

7590 01/28/2002

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EXAMINER

KANG, DONGHEE

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 01/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/373,544

Applicant(s)

NAKATSU ET AL.

Examiner

Donghee Kang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Acknowledgment*

1. Applicant's Amendment and Response to Paper No.7 has been entered and made of Record. Claims 11-14 have been added. Thus claims **1-14** are pending in this office action.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims **1 & 5-10** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Referring claim **1**, the phrase "*a layered structure, made of an AlGaInP type compound semiconductor material*" is misdescriptive because the layered structure 12 includes n-GaAs buffer layer 2, AlGaInP light emitting layer 11, and p-AlGaInP current diffusion layer 10 as shown in Fig.4. Therefore, the layered structure 12 is made of an AlGaInP and GaAs.

Referring to claim **5**, being dependant on claim 1, the phrase "*a value of 1-y in the composition of AlGaIn<sub>1-y</sub>P varies along a thickness direction of the layered structure*" in lines 4-5 makes the phrase "*the lattice mismatch of the current diffusion layer with respect to the light emitting structure is -1 % or smaller*" claimed independent claim 1 unclear. It is well known in the art that, the lattice mismatch constant is varied when Indium (In) mole fraction of the AlGaInP layer is changed. Thus it is unclear how to

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remain the lattice mismatch of between the current diffusion layer respect to the light emitting structure,  $-1\%$  or small, without changing during varying only a fraction of Indium (In) of the current diffusion layer.

Referring claims **6-7**, being dependant on claim 1, are rejected for the same reasons as given for the rejection of claim 5.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims **11 & 14** are rejected under 35 U.S.C. 102(e) as being anticipated by Hosoba (US 5,814,839).

Hosoba discloses a light-emitting diode comprising (Fig.18):

a semiconductor substrate (31), wherein the semiconductor substrate is inclined in a [011] direction with respect to a (100) plane thereof; and a layered structure (160)

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comprising an AlGaInP type compound semiconductor material provided on the semiconductor substrate, the layered structure comprising:

a light emitting structure comprising of a pair of cladding layers and an active layer for emitting light provided between the pair of cladding layers (62 & 64) and a current diffusion layer (63) comprising an AlGaInP type compound semiconductor material, the current diffusion layer being lattice mismatched with the light emitting structure. *See also Col.39, line 45 – Col.41, line 4*

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 3, & 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoba (US 5,814,839)

Regarding claims 1, 3 & 12-13, Hosoba discloses a light emitting diode comprising (Fig.18):

a semiconductor substrate (31); a layered structure (160), made of an AlGaInP type compound semiconductor material and provided on the semiconductor substrate, wherein the layered structure comprises:

a light emitting structure composed of a pair of cladding layers (62 & 64) and an active layer (63) for emitting light provided between the pair of cladding layers;

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and a current diffusion layer (156) comprising an AlGaInP type material which is lattice mismatched with the light emitting structure. *See also Col.39, line 45 – Col.41, line 4.*

Hosoba does not explicitly teach a lattice mismatch of current diffusion layer with respect to the light emitting structure is  $-1\%$  or smaller.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to select a lattice mismatch of layer in device, since it has held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skills in the art

Regarding claim 2, Hosoba teaches the semiconductor substrate is inclined in a [011] direction with respect to a (100) plane thereof but does not teach inclined by  $8^\circ$  to  $20^\circ$ .

Regarding claim 4, Hosoba teaches a composition of the current diffusion layer is expressed as  $(\text{Al}_x\text{Ga}_{1-x})_{1-y}\text{In}_y\text{P}$ , and  $x$  is set in the range of 0 to 1 and  $y$  is set in the range of 1 to 1 in the composition, which are in the claimed range.

### **Conclusion**

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Donghee Kang, Ph.D.  
January 14, 2002

  
**TOM THOMAS**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**